REMARKS

The Office Action of June 1, 2001 has been received and its contents carefully considered.

Applicants have amended Table 1 of the present specification. As originally filed, Table 1 disclosed that the density of the sintered body obtained by Example 5 is 3.871. This, however, is a typographical error because the detailed description of Example 5 clearly shows the density of the sintered body to be 3.971. See page 27, line 1. Applicants therefore have amended Table 1 to refer to the correct density.

The Examiner objects to the Abstract because it contains legal phraseology. The Examiner particularly refers to the word "comprising" and to MPEP §608.01(b). Applicants again submit that the Abstract is in compliance with the requirements of MPEP §608.01(b). Thus, MPEP §608.01(b) does not indicate that the word "comprises" is a word that should be objected to as containing legal phraseology. Applicants know of decision in which the word "comprises" has been required to be deleted from an Abstract. Applicants point out that many issued patents employ this word. For example, the Huang patent newly cited by the Examiner employs the word "comprises". Accordingly, applicants request withdrawal of this rejection.

Claims 1 to 8 have been rejected under 35 U.S.C. § 103(a) as obvious over Mohri et al in view of either the newly cited patent to Huang or the newly cited patent to Ali et al.

Applicants submit that these patents do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of this rejection.

The present invention relates to a process for producing a polycrystalline alumina sintered body which comprises the steps of preparing a slurry by subjecting alumina powder and

a solvent to ultrasonic irradiation, mechanical stirring not using a grinding medium, or ultrasonic irradiation and mechanical stirring not using a grinding medium, to provide a slurry of alumina dispersed in a solvent. The slurry is dried and formed to produce a green body. The green body is then sintered in an air atmosphere at a temperature in the range of 1400°C to 1800°C.

As set forth in claim 1, the alumina powder has a purity of 99.99 wt% or more, and comprises α alumina particles having substantially no fractured surface. Claim 1 sets forth specific properties for the alumina powder.

In essence, the Examiner states that Huang and Ali et al disclose mixing a slurry of powder and solvent by ultrasonic energy, and argues that in view of the teaching at column 6, line 31 of Mohri et al that the mixing in Mohri et al can be carried out in any conventional manner, it would have been obvious to employ an ultrasonic mixing to make the slurry in Mohri et al.

Both Huang and Ali et al disclose employing ultrasonic mixing to make a slurry.
1 Applicants submit, however, that one of ordinary skill in the art would not have been lead to combining the teaching of these references with Mohri et al because they do not relate to the same art. In particular, according to Mohri et al, the main object of the invention is to provide an alumina composition which provides, on sintering, an alumina ceramic having wrap resistance and high dimensional precision. See column 2, lines 5-8. On the other hand, the object of the invention disclosed in Ali et al is to provide an improved packaging material for use with electronic devices, see column 2, lines 9-20. Ali et al is directed to making an alumina nitride/aluminum composite, and does not relate to making alumina slurries. Further, the

invention disclosed in Huang is directed to a method for producing a sintered reaction bonded silicon nitride composite which is reinforced with silicon carbide whiskers, which contains silicon nitride particles, or both. Thus, the Huang patent is directed to a silicon nitride composite containing silicon carbide whiskers or silicon nitride powders, and does not have anything to do with making alumina slurries.

2 The statement in Mohri et al that conventional mixing can be used refers to conventional methods of mixing alumina slurries. Mohri et al describe two such methods, namely, ball mill or a vibration mill, each of which involves a grinding. Applicants submit that is was not conventional to mix alpha alumina by ultrasonic mixing.

One of the purposes of employing the ultrasonic mixing in the present invention, as disclosed at page 10 of the present specification, is to reduce the formation of aggregates. The Huang patent, at column 3, lines 23 to 25, discloses that ultrasonic vibration breaks down agglomerates.

As described at page 10 of the present specification, the alumina powder used as a raw material in the present invention contains such small amount of agglomerates, and such uniform particle shape and particle size, that the alumina powder can be dispersed to form a uniform slurry only by irradiating with ultrasonic wave. It is also well known that the mixing methods using grinding media have higher energy to reduce the formation of agglomerates than an irradiation with ultrasonic wave. Thus, even if Huang discloses ultrasonic irradiation to reduce the formation of agglomerates, it does not mean that it is obvious to replace the mixing methods using the grinding media in Mohri et al with the ultrasonic mixing technique of Huang because

Huang does not disclose or teach the alumina powder used in the present invention that contains small amount of agglomerates and has a uniform particle shape and the particle size recited in claim 1. Further, Huang merely discloses the use of an ultrasonic mixer.

In view of the above, there is no motivation to combine Mohri et al with Ali et al or Huang, much less to replace the mixing methods using the grinding media in Mohri et al with the ultrasonic mixing technique of Huang or Ali et al.

The Examiner further states that with respect to the recitation in the claims that the particles have substantially no fractured surface, that this recitation covers the presence of a single particle having no fractured surface. The Examiner states that "it is notoriously well known in the art the during mixing or milling some particles are unchanged and thus no fractured surfaces exist".

As regards substantially "no fracture surface", applicants submit that the Examiner misunderstands the recitations of the present claims. According to the present invention, the particles having substantially no fractured surface are the alumina powder used as a raw material, and are not particles that have been mixed or milled in the steps that occur after the step of preparing the slurry. Thus, it is irrelevant whether some particles are unchanged during mixing or milling.

One of the features of the present invention is to use alumina powder comprising polyhedral particles having substantially no fractured surface. The alumina powder employed in the present invention mainly includes polyhedral powders having substantially no fractured

surface. The presence of a single particle having substantially no fractured surface would not satisfy the recitations of the present claims.

By using such specific alumina powder as set forth in claim 1, applicants can achieve the present invention.

Additionally, by using ~~alumni~~ alumina powder comprising particles having substantially no fractured surface, the alumina powder is prevented from secondary agglomeration in the steps after the step of preparing the slurry.

In view of the above, applicants submit that the cited prior art does not disclose or, suggest the use of an alumina powder having substantially no fractured surface.

5 The Examiner states that the powder purity levels disclosed in Mohri et al encompass the claimed ranged. Applicants have previously argued that Mohri et al do not disclose an alpha alumina having a purity of 99.99 weight percent or more.

The fact that Mohri et al disclose an alumina purity of not less than 99.95% by weight does not mean that Mohri et al suggest a purity of 99.99% by weight. The powder purity levels disclosed in Mohri et al encompass the claimed range, but Mohri et al do not suggest a purity of 99.99% or more as claimed in the present invention.

In view of the above, applicants submit that the present invention is not obvious over Mohri et al in view of either one of Ali et al or Huang and, accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

Sheldon I. Landsman

Sheldon I. Landsman
Registration No. 25,430

SUGHRUE, MION, ZINN,
MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: September 4, 2001

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/361,118

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TABLES:

Table 1, second page, is changed as follows in Example 5, in the column headed "Density of sintered body":

	Molding method	Sintering temperature	Density of sintered body	Purity of sintered body	Number of pores	Number of pores	Corrosion test	Pore area prior to corrosion	Pore area subsequent to corrosion
		℃	g/cm³	Alumina %	≦10 μm	≧10 μm		%	%
Example 1	Press molding	1650	3.974	99.99	12	0	○	≦0.01	0.02
Example 2	Slip press molding	1650	3.977	99.99	18	0	○	≦0.01	0.02
Example 3	Press molding	1550	3.975	99.99	15	0	○	≦0.01	0.02
Example 4	Press molding	1600	3.980	99.99	5	0	○	≦0.01	0.01
Example 5	Press molding	1750	~~3.871~~ 3.971	99.99	15	0	○	≦0.01	0.02
Example 6	Press molding	1550	3,984	99.98	7	0	○	≦0.01	0.02
Example 7	Press molding	1600	3.982	99.95	4	0	○	≦0.01	0.01
Example 8	Press molding	1600	3.982	99.99	5	0	○	≦0.01	0.01
Example 9	Slip press molding	1600	3.983	99.95	4	0	○	≦0.01	0.02
Example 10	Press molding	1600	3.980	99.90	5	0	○	≦0.01	0.01
Example 11	Tape molding	1550	3.982	99.95	6	0	○	≦0.01	0.02
Example 12	Press molding	1700	3.980	99.99	6	0	○	≦0.01	0.01
Example 13	Press molding	1600	3.981	99.99	7	0	○	≦0.01	0.01
Example 14	Press molding	1600	3.982	99.99	4	0	○	≦0.01	0.01
Comparative example 1	Slip press molding	1600	3.935	99.99	Large number	65	×	0.08	0.5
Comparative example 2	Press molding	1650	3.945	99.99	Large number	50	×	0.11	0.7
Comparative example 3	Press molding	1750	3.950	99.99	Large number	35	×	0.15	0.9
Comparative example 4	Press molding	1550	3.972	99.95	Large number	34	×	0.08	0.5
Comparative example 5	Press molding	1700	3.900	99.95	Large number	46	×	0.11	0.7
Comparative example 6	Press molding	1600	3.900	99.95	Large number	69	×	0.15	0.9
Comparative example 7	Press molding	1600	3.870	99.50	Large number	Large number	×	0.17	2.1
Comparative example 8	Press molding	1500	3.800	99.95	Large number	Large number	×	0.2	2.3